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Report to Congressional Committees

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COMBAT AIR POWER

Assessment Of Joint Close Support Requirements and Capabilities Is Needed



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Congressional Committees

Combat Air Power:
Assessment of Joint
Close Support
Requirements and
Capabilities is Needed

Over the next 6 years, the military services plan to spend more than \$10.5 billion on aircraft and other weapons to improve their formidable existing close support capabilities. These plans, however, come at a time of reduced defense budgets, force structure reductions, and questions about the affordability of future defense modernization programs.

This report (1) discusses the aggregate capabilities of the military services to provide close support and the extent to which those capabilities continue to be modernized and enhanced and (2) evaluates the processes the Department of Defense (DOD) uses to assess mission needs, capabilities, and modernization proposals for the close support mission. This report contains a recommendation to the Secretary of Defense that could improve DOD's requirements generation process.

This review was part of our broader effort to assess how DOD can better adapt its combat air power to meet future needs. We are addressing this report to you because of your responsibilities for the issues discussed and your interest in the subject.



Richard Davis
Director, National Security
Analysis

List of Congressional Committees

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Executive Summary

Purpose

Close support weapons fire on targets close to U.S. ground forces and, as a result, are likely to influence the outcome of a battle. The military services have significantly improved the capability of their close support weapons since the 1980s and plan to spend more than \$10.6 billion on further improvements between fiscal years 1996 and 2001. These plans however, come at a time of reduced defense budgets, defense downsizing, and questions about the affordability of future defense modernization programs. This report (1) discusses the aggregate capabilities of the military services to provide close support and the extent to which those capabilities continue to be modernized and enhanced; and (2) evaluates the processes the Department of Defense (DOD) uses to assess mission needs, capabilities, and modernization proposals for the close support mission. This review was part of GAO's broader effort to assess how DOD can better adapt its combat air power to meet future needs.

Background

The services have developed a large number of weapons that can be used for close support. Some were developed specifically for the close fire mission, while others were developed as multi-role weapons that can also perform interdiction, reconnaissance, or air-superiority missions. Systems that can provide close support include Army and Marine Corps cannon and rocket artillery and attack helicopters; Navy, Marine Corps, and Air Force fixed-wing aircraft; and naval guns on surface ships. These systems can be used against a variety of close support targets, such as enemy troops; tanks and other fighting vehicles; artillery; fortifications; command, control, and communications systems; air defenses; and tactical logistical support units.

Close support is needed in a broad range of combat situations. Therefore, the close support system of choice will vary based on the specific mission at hand, threat environment, time of day, weather conditions, and proximity to forces needing support. Artillery can be fired at night and in all weather conditions. Attack helicopters can attack targets beyond the reach of close support artillery. Fixed-wing aircraft have greater speed and range than attack helicopters and can fly at high altitudes to avoid air defense systems. The effectiveness of each system also varies against specific types of targets.

In addition to the wide range of circumstances in which close support may be needed, several other factors account for the extent of close support capability in the force. First, title 10 U.S.C. and DOD Directive 5100.1 spell out the broad missions for each of the services. To carry out these

missions, each service acquires some organic close support capability independent of the other services. For example, the Army acquires artillery and attack helicopters not solely on the basis of its close support mission but also on the basis of its broader responsibility "to defeat enemy land forces." Second, under DOD's assignment of functions to the individual services, all four services have a primary responsibility for conducting close air support (CAS)—the fixed- and rotary-wing air component of close support. Third, some systems used for close support missions have been assigned multiple roles and therefore have not been developed solely on the basis of close support requirements. Finally, because close support needs may arise unexpectedly, each service seeks a certain degree of independence in its capabilities since there is no assurance that other services' weapons can be made available to respond in time.

Results in Brief

Collectively, the services' current mix of weapon systems constitutes a formidable joint close support capability. Nevertheless, the services plan to invest more than \$10.6 billion over the next 6 years in weapons upgrades and enhancements to further add to this capability. Whether these investments represent the most appropriate, cost-effective mix of weapon systems to meet close support missions is unclear because each military service has continued to propose enhancements to its capabilities without adequate consideration of the capabilities of its other weapons or those of other services.

DOD's current assessment processes do not yield the information that the Secretary of Defense needs to weigh the merits of service-generated weapons acquisition and modernization proposals for the close support mission. The services generate their proposals from a service rather than joint perspective and frequently consider only weapons in the same general category in seeking potential solutions to identified deficiencies.

Nor do the Department's assessment processes enable the Chairman, Joint Chiefs of Staff, to provide effective military advice to the Secretary of Defense on the services acquisition and modernization proposals for close support. The Joint Requirements Oversight Council (JROC) has only assessed modernization proposals involving major weapon systems rather than the full range of weapons used for close support. Moreover, its assessments have been heavily influenced by service-generated analysis. Although a joint warfighting capabilities assessment (JWCA) process was instituted in 1994 to support the JROC in its recommendations to the Chairman, a separate assessment of the close support mission has not yet

been made. Without a comprehensive assessment of joint mission needs and existing capabilities for close support, the Chairman cannot provide the independent military advice the Secretary needs in deciding which systems should be funded, in what quantities they should be procured, and what priority should be assigned to competing proposals.

Principal Findings

Services Plan to Further Improve Their Close Support Capabilities

Since the mid-1980s, the Army has increased its close support capabilities by adding the AH-64 Apache attack helicopter and the Multiple Launch Rocket System to its inventory. The Apache can locate and engage targets from long distances at night, and the MLRS can fire 12 rockets nearly simultaneously at targets up to about 32 kilometers. The Navy and Marine Corps have added improved targeting capabilities on F/A-18 and AV-8B aircraft, making a portion of these aircraft capable of navigating and identifying targets at night. The Air Force has added limited night capability to the A/OA-10 and has designated some F-16 aircraft to provide CAS. Some of these aircraft are equipped to navigate and engage targets at night.

Over the next 6 years, the Army plans to spend nearly \$5.5 billion to develop and field more modern artillery, aviation, and target acquisition systems. Over the same period, the Marine Corps plans to spend about \$3.2 billion to remanufacture AV-8B aircraft, install night targeting capability on AH-1W Supercobra attack helicopter, and develop a lightweight towed 155-millimeter howitzer. The Air Force plans to spend over \$547 million to upgrade the target acquisition and night operations capabilities of about 620 fixed-wing aircraft for CAS. While some of these upgrades may also enhance capabilities in other mission areas, some, such as the upgrades to the Air Force A/OA-10s, are designed specifically to improve close support capabilities.

A Comprehensive Assessment of Joint Close Support Mission Needs and Existing Capabilities Is Needed

DOD has not determined the appropriate number and type of weapons it needs for the joint close support mission. The lack of an overall assessment of joint close support mission needs and existing capabilities has allowed the services to individually improve their close support capabilities without adequately considering the potential contributions of their other weapons or those of other services. In May 1994, the Air Force

decided to modify its A/OA-10 and some F-16 aircraft rather than procure a new aircraft solely for CAS. However, it made this decision without considering whether attack helicopters and artillery could satisfy some or most of the CAS requirement. In its submission to the Commission on Roles and Missions of the Armed Forces, the Army acknowledged that the added firepower of rockets, artillery, and attack helicopters had "substantially reduced the need for fixed wing fire support." Improvements to artillery and attack helicopters now permit the Army to engage targets that could formerly only be attacked by fixed-wing aircraft.

In May 1995, the Commission on Roles and Missions of the Armed Forces noted that the current requirements determination and acquisition system has resulted in individual services prematurely endorsing new weapon systems without looking at other alternatives. Although DOD's acquisition system calls for the JROC to provide assessments to the Secretary on major modernization programs, 9 of 12 modernization programs proposed for close support were not assessed because they are not considered major acquisitions. The JROC recently expanded its review process to include some non-major systems.

In 1994, the Chairman, Joint Chiefs of Staff, established the JWCA process to provide insight into issues involving joint warfighting requirements and plans for recapitalization for selected joint missions areas. These assessment were expected to support the JROC in developing its recommendations on joint requirements to the Chairman. JWCA working group members are drawn from the Office of the Secretary of Defense, the military services, and regional combatant command staffs.

Under the JWCA process, assessment of joint close support needs and capabilities was initially split between the ground maneuver and joint strike assessment working groups, with the ground maneuver working group responsible for integrating the results of the two assessments. However, according to joint staff officials, this latter group encountered difficulties in organizing its effort and after more than a year it was re-chartered before making any recommendations. Renamed the Land and Littoral Warfare JWCA, the working group is expected to include assessment of joint close support mission needs and capabilities.

While the anticipated assessment could improve the information available to the Secretary of Defense to weigh acquisition and modernization proposals for close support, questions remain over how the working group will interpret the scope of its work. For example, it is unclear what priority

the working group will give to the close support assessment and whether the assessment will include the full range of weapon systems that can be used for this mission. It is also unclear whether the working group will address the question of sufficiency—the mix and quantity of systems that are needed for the overall close support mission. Moreover, it is unclear how the working group intends to overcome the problem of being too heavily dependent upon service-generated analysis.

Recommendation

To assist the Secretary of Defense in determining whether and which proposed enhancements to close support systems should be funded, and in what quantities and priority, GAO recommends that comprehensive cross-service assessments of overall joint close support mission needs, existing close support systems, and planned enhancements be made on a routine basis. Such assessments might be made within the context of the JWCA process although alternative mechanisms might be explored.

To be useful to decisionmakers, these assessments should include a determination of which existing capabilities should be retained, modernized, or retired and in what quantities to ensure full joint capability. They should be broad enough to encompass all close support capabilities—not just major weapon systems—and service-generated analysis should be supplemented by other analytical support, where independence is critical. Because some systems have multiple roles, the assessments need to recognize the contributions of these systems to these other missions.

Agency Comments

DOD said that it partially concurred with GAO's recommendation. DOD also said that, as part of the JWCA process, it was currently assessing the requirements and capabilities needed to win the close battle and that it would assess current and future weapons necessary for each service for the close battle during a future phase of its deep attack weapons mix study.

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Abbreviations

ATACMS	Army Tactical Missile System
ATHS	Automated Target Hand-off System
CAS	Close Air Support
DOD	Department of Defense
GAO	General Accounting Office
IDM	improved data modem
JROC	Joint Requirements Oversight Council
JWCA	Joint Warfighting Capabilities Assessment
LANTIRN	Low-Altitude Navigation and Targeting Infra-Red for Night
MDAP	Major Defense Acquisition Program
MLRS	Multiple Launch Rocket System
PPBS	Planning, Programming, and Budgeting System
R&D	research and development
RDT&E	research, development, test, and evaluation

Introduction

As the experiences in Panama, the Persian Gulf War, and Somalia have illustrated, U.S. military forces can quickly be exposed to the dangers of close combat. To be successful, U.S. ground troops engaged in close combat with enemy forces need capable close support—firepower against hostile targets that present an immediate and serious threat to U.S. ground forces operating close to enemy forces. In executing close support, the actions of supporting and supported forces must be closely coordinated and integrated to avoid fratricide.

Close support is delivered primarily by mortars, artillery, fixed-wing aircraft, attack helicopters, and naval guns. CAS—the air component of close support—is provided by Army, Navy, Marine Corps, and Air Force fixed-wing and rotary-wing aircraft. Close support targets generally include enemy troops, tanks, fighting vehicles, fortifications, mortars, and artillery; they may also include enemy command, control, and communications systems; air defenses; and tactical logistical support units.

Services Have Developed Diverse Close Support Systems

The services operate a large number and variety of close support systems capable of engaging similar targets, including five types of artillery, four types of attack helicopters, five types of fixed-wing aircraft, and 5-inch naval guns on cruisers and destroyers. One aircraft was developed specifically for the close support mission, while others are considered multi-role assets that can also be used for other missions, such as interdiction, reconnaissance, or air superiority. The effectiveness of the individual weapons depends in part on their specific capabilities and the availability of target acquisition; command, control, communications and intelligence systems; and logistical support.

According to DOD officials, the systems that have been developed provide the services with complementary capabilities that provide flexibility to joint force commanders. Several factors account for the growth of close support systems across the services. First, title 10 U.S.C. and DOD Directive 5100.1 spell out the broad missions for each of the services. To carry out these missions, each service acquires some organic close support capability independent of the other services. For example, the Army acquires artillery and attack helicopters not solely on the basis on its close support missions but also on the basis of its broader responsibility “to defeat enemy land forces.” Second, under DOD’s assignment of functions to the individual services, all four services have a primary responsibility for

conducting CAS.¹ Third, some systems used for close support missions can perform multiple roles and therefore have not been developed solely on the basis of close support requirements. Fourth, changes in equipment and doctrine, such as the development and use of Army attack helicopters as maneuver units, have greatly altered the complexity and scope of warfighting operations, including close support. Finally, because the need for close support may arise unexpectedly, each service seeks a certain degree of independence in its close support systems since there is no assurance that other services' weapons can be made available to respond in time.

Table 1.1 shows the inventory of service assets that can be used for close support missions that existed in fiscal years 1990 and 1994 and the inventory projected for fiscal year 2001. Some of the assets shown also perform other missions such as interdiction, reconnaissance, or air superiority in addition to providing close air support.

¹Prior to 1993, the Army had not been assigned CAS as a primary responsibility.

Table 1.1: Inventory of Systems Used to Provide Close Support

System	Service	Inventory		
		FY 1990	FY 1994	FY 2001^a
105 mm towed howitzers	Army/USMC	774	522	450
155 mm towed howitzers	Army/USMC	1,171	894	822
155 mm self-propelled	Army/USMC	1,932	1,884 ^b	1,684 ^b
8 inch self-propelled	Army/USMC	1,134	624 ^b	0
MLRS launchers	Army	279	459	726
Total artillery		5,290	4,383	3,682
AH-1J/T/W	USMC	118	170	169 ^c
AH-1F/S Cobra	Army	1,034	677	379
AH-64 Apache	Army	602	738	758
OH-58D Kiowa Warrior	Army	0	175	546
Total attack helicopters		1,754	1,760	1,852
F/A-18	Navy/USMC	332	1,165	1,017
A-6E	Navy/USMC	337	181	0
AV-8B	USMC	169	200	174
F-16 ^d	Air Force	1,613	741	825
A/OA-10	Air Force	639	381	366
Total fixed-wing aircraft		3,090	2,668	2,382

^aThese figures are DOD projections.

^bThe Marine Corps no longer maintains self-propelled howitzers.

^cThese are AH-1W Supercobra models.

^dThe Air Force considers all F-16s CAS-capable, and a majority of F-16 units have CAS as one of several assigned missions.

Close support is needed in a broad range of combat situations. Therefore, the system of choice will vary based on the specific mission at hand, threat environment, time of day, weather conditions, and proximity to forces needing support. The strengths and limitations of the various categories of systems are described below.

Artillery

Artillery is used to provide close support for maneuver forces; counterfire to attack enemy artillery, mortars, and air defense systems; and interdiction fire to disrupt, delay, and destroy enemy forces that are not yet in contact with friendly forces. Artillery can be fired at night and under all weather conditions. The Army operates 105-millimeter towed,

155-millimeter towed and self-propelled, and 8-inch self-propelled howitzers and the Multiple Launch Rocket System (MLRS), a mobile rocket artillery system capable of firing 12 rockets that carry various munitions. The Army plans to retire its 8-inch howitzers in the near future. The Marine Corps uses the 155-millimeter towed howitzer for all combat missions. The maximum effective range of artillery is between 14.9 kilometers for 105-millimeter and 30 kilometers for 155-millimeter howitzers with rocket-assisted projectiles, and 32 kilometers for the MLRS. According to some Army and Marine Corps ground force commanders, artillery is a reliable and responsive close support weapon system.

Attack Helicopters

Attack helicopters can destroy tanks and other armored vehicles with precision-guided missiles. They can also engage and suppress enemy troops and artillery with rockets and cannon fire. A majority of Army and Marine Corps attack helicopters can identify and engage targets at night, but their capabilities are limited by adverse weather. Attack helicopters can (1) be based near ground forces; (2) loiter and be refueled and rearmed close to the area of close combat; (3) be used to identify targets and control the fires of other CAS aircraft, mortars, and artillery; and (4) engage targets well beyond the range of artillery. In the Persian Gulf War, Army attack helicopters successfully conducted combat operations up to 315 nautical miles behind enemy lines. The Army currently operates three types of attack helicopters—the AH-1F/S Cobra, AH-64 Apache, and OH-58D Kiowa Warrior—and the Marine Corps operates AH-1W Super cobras. The helicopters can be used for fire support or as maneuver units. Their effectiveness can be limited by adverse weather, air defenses, and the inability to deliver heavy bombs.

Fixed-Wing Aircraft

Fixed-wing aircraft are able to engage a variety of close support targets depending on the ordnance they carry. However, because these aircraft can carry heavier weapons, they are most appropriately used against hardened targets. Fixed-wing aircraft have greater speed and range than attack helicopters and can fly at high altitudes to avoid air defense threats. However, they have more difficulty in identifying and acquiring targets and providing accurate strikes from higher altitudes. Currently, only about 60 percent of fixed-wing aircraft used by the services for CAS are able to operate at night. Fixed-wing aircraft effectiveness can also be limited by adverse weather.

The services currently use several aircraft to perform CAS—Air Force A/OA-10s and F-16s, Navy F/A-18s and A-6Es, and Marine Corps F/A-18s and AV-8Bs. Of these aircraft, only the A/OA-10 was designed specifically for CAS functions. Some of these aircraft are also capable of carrying out interdiction, reconnaissance, and air superiority missions.

Naval Guns

The Navy currently operates 5-inch, 54-caliber guns on cruisers and destroyers for ship self-defense and ship-to-shore fire support of Army and Marine Corps ground forces. These guns, like artillery, are able to fire at night and in all weather. Accuracy of naval gunfire is difficult to control because of the movement of ships in the water and the wide dispersion of unguided 5-inch projectiles at extended ranges. Consequently, according to Navy and Marine Corps officials, naval gunfire must be used judiciously to avoid fratricide. The Navy's current 5-inch guns can engage targets to a maximum range of about 13 nautical miles.

Objectives, Scope, and Methodology

This report (1) discusses the aggregate capabilities of the military services to provide close support and the extent to which those capabilities continue to be modernized and enhanced and (2) evaluates the processes the Department of Defense (DOD) uses to assess mission needs, capabilities, and modernization proposals for the close support mission. Although ground forces can use a number of direct-fire weapons systems for close support, such as tank guns, machine guns, and missiles, we focused our review on the primary weapons used for close support: artillery, attack helicopters, fixed-wing aircraft, and naval guns.

We reviewed DOD's and the services' requirements generation process and our previous reports on the acquisition process. We obtained information from the Joint Staff on the development of the JWCA process. We also determined the number of close support modernization programs that had been reviewed by the JROC and obtained documents from the council pertaining to these programs.

To assess the capabilities and characteristics of existing close support systems, we reviewed technical manuals, doctrinal publications, and service documents and held discussions with users in operational units. We discussed capabilities, force structure, and operational issues with officials in the Office of the Secretary of Defense, the Office of the Chief of Naval Operations, the Offices of the Army and Air Force Chiefs of Staff, and Marine Corps Headquarters located in Washington, D.C. We also

reviewed service and joint close support doctrine with officials from the Air Force's Air Combat Command, the Army's Training and Doctrine Command, and the Air Land Sea Applications Center in Hampton, Virginia; the Naval Doctrine Commander, Norfolk, Virginia; and the Marine Corps' Combat Development Command in Quantico, Virginia.

To gain an understanding of how operational units plan for and use close support, we observed (1) a Marine Corps fire support exercise at the Air Ground Combat Center, Twentynine Palms, California; (2) Navy close air support training at the Naval Strike Warfare Center, Fallon, Nevada; and, (3) Air Force CAS and Army fire support training at the Joint Readiness Training Center, Fort Polk, Louisiana; and, at the National Training Center, Fort Irwin, California. We interviewed additional personnel including officials of the 18th Air Support Group at Barksdale Air Force Base, Louisiana, and its detachment at Fort Polk and the 57th Air Wing at Nellis Air Force Base, Nevada, and its detachment at Fort Irwin. Representatives of the U.S. Army Field Artillery Center, Fort Sill, Oklahoma, provided us with documentation on the use and employment of field artillery and supporting systems.

Active Army and Marine Corps infantry, artillery, and aviation units provided operational perspectives on the performance and use of close support, deficiencies and requirements, and training. We visited the headquarters and units of the 24th Mechanized Infantry Division, Fort Stewart, Georgia; III Corps Artillery, Fort Sill, Oklahoma; XVIIIth Airborne Corps and 82d Airborne Division, Fort Bragg, North Carolina; 101st Airborne Division, Fort Campbell, Kentucky; 2nd Marine Expeditionary Force and 2nd Marine Division at Camp Lejeune, North Carolina; and the 2nd Marine Air Wing at Marine Corps Air Stations, at Cherry Point and New River, North Carolina.

To obtain the perspectives of unified commanders, we interviewed officials from the staff of the Commander in Chief, U.S. Central Command, and Commander in Chief, U.S. Special Operations Command, MacDill Air Force Base, Tampa, Florida. We also received written comments regarding close support from the staff of the Commander in Chief, U.S. Pacific Command, and the staff of the Commander in Chief, U.S. Forces, Korea.

In reviewing some of DOD's planned modernization programs, we developed information and issued separate reports on the Navy's plan to upgrade guns on surface ships for the naval surface fire support mission and on the Army and Marine Corps plan to develop a lightweight

155-millimeter howitzer. These and our other recent reports on weapon systems used for close support are listed on the last page of this report. This list also includes references to two earlier reports that discuss DOD's weapons acquisition process.

We performed our review between June 1993 and October 1995 in accordance with generally accepted government auditing standards.

Services Plan to Further Improve Their Close Support Capabilities

Collectively, the services' current mix of weapon systems constitutes a formidable joint close support capability. Since the early 1980s, the services have significantly improved their close support capabilities, and, between fiscal years 1996 and 2001, plan to spend more than \$10.6 billion to further improve existing capabilities. Of that amount, almost \$5.5 billion will be used to upgrade AH-64 Apache helicopters, radars, and fire support vehicles, and to develop the Crusader 155-millimeter field artillery system. Other improvements include upgrades to Air Force A/OA-10s and some F-16s for the CAS role, installing night targeting systems on Marine Corps AH-1W Supercobra attack helicopters, and remanufacturing Marine Corps AV-8B with improved capability to identify and acquire targets, especially at night.

During this period, the Army fielded the Apache attack helicopter, MLRS, and Army Tactical Missile System (ATACMS). It also improved fire control systems for these weapons. The Navy improved the night navigation and attack capabilities of its F/A-18 aircraft. The Marine Corps made improvements in the night attack capabilities of some AV-8B aircraft and began using the M-198 155-millimeter howitzer. The Air Force retained the A/OA-10 for CAS and equipped some F-16 aircraft with navigation and targeting systems to perform CAS at night.

Some Close Support Capabilities Have Improved Significantly

Some close support capabilities have improved significantly since the 1980s. In the mid-1980s, the Army began fielding the AH-64 Apache attack helicopter. The Apache is able to fire laser-guided Hellfire missiles against armored targets at long ranges, carries a 30-millimeter cannon, and can locate and engage targets at night.

In 1983, the Army began fielding the MLRS primarily to destroy enemy artillery and rocket launchers. In 1990, the Army began fielding ATACMS, a long-range precision-guided missile fired from MLRS launchers. The range of ATACMS is triple that of conventional MLRS rockets and cannon artillery. Even though ATACMS is not used specifically for close support, it provides the Army with the capability of destroying targets that could ultimately influence the close battle. Each MLRS launcher can fire two ATACMS. In 1993 the Army began fielding its M109A6 155-millimeter Paladin self-propelled howitzer. The Paladin is a major modification of existing M109A2/3 howitzers, which the Army fielded in the 1970s. Unlike other self-propelled howitzers, the Paladin is equipped with a fire control system that allows each howitzer to locate and orient itself, making it more effective than

unmodified and older self-propelled or towed howitzers. The Army plans to field approximately 890 Paladin systems by the end of fiscal year 2000.

The ability of the Air Force to provide CAS has also improved over the past decade. Even though the Air Force lost longer range CAS aircraft by retiring the A-7s in the early 1990s, it now employs A/OA-10s and multi-role F-16s for CAS. The A/OA-10, specifically designed for CAS, is able to carry a large amount of ordnance, can loiter in the battle area for up to 1.7 hours, and was designed to survive light air defenses at low altitudes. F-16s have greater speed and are able to engage targets from higher altitudes than either A/OA-10 or A-7 aircraft. In addition, some F-16s are equipped with Low-Altitude Navigation and Targeting Infra-Red for Night (LANTIRN) systems, which allow F-16 pilots to navigate and identify targets at night.

The Marine Corps has also improved its close support capabilities. It reduced its artillery force structure by nearly 50 percent since 1988 by retiring its 155-millimeter and 8-inch self-propelled howitzers that had been used for general support, and the 105-millimeter towed howitzers that had been its primary direct support weapon. The Marines now use the M-198 155-millimeter towed howitzer for both direct and general support. The M-198 provides more range and lethality than 105-millimeter howitzers and is easier to transport than the self-propelled howitzers it replaced. The Marine Corps also upgraded its AV-8B Harrier aircraft used primarily for CAS. The AV-8B is capable of vertical/short takeoff and landings and can perform CAS, interdiction, and air-to-air operations. In the early 1990s, the Marine Corps installed night capability on 66 of the day-attack version of the AV-8Bs and installed both night capability and an air-to-ground radar on an additional 28 day-attack aircraft. The Marine Corps is remanufacturing 72 day-attack aircraft into radar/night attack aircraft. The final projected inventory includes 36 day-attack, 56 night-attack, and 99 radar/night-attack aircraft.

The Navy has improved close support capabilities by installing navigation and targeting forward-looking infrared pods on F/A-18s. These pods will enable it to locate and engage targets at night.

Chapter 2
Services Plan to Further Improve Their
Close Support Capabilities

Services Plan Extensive Modernization of Close Support Capabilities

Between fiscal years 1996 and 2001, the services plan to spend more than \$10.6 billion to improve a number of weapons systems that can be used for close support. Some of these weapons can also be used for other combat missions, such as interdiction, reconnaissance, and air superiority. Table 2.1 shows the specific modernization plans and projected costs.

Table 2.1: Service Plans and Projected Costs for Modernizing Close Support Capabilities, Fiscal Years 1996-2001

Dollars in millions				
Modernization plans	Service	R&D	Procurement	Total
AV-8B Remanufacture ^d	Marine Corps	92.8	2,191.8	2,284.6
250 F-16 Block 40 CAS upgrades	Air Force	80.3	189.7	270.0
373 A/OA-10 CAS upgrades	Air Force	52.1	225.1	277.2
AH-1W Modification ^a	Marine Corps	529.0	215.0	744.0
AH-64D Longbow ^d	Army	28.9	3,148.7	3,177.6
Lightweight 155-millimeter howitzer ^d	Army and Marine Corps	126.2	99.8	226.0
Crusader Field Artillery System ^d	Army	1,977.5	^b	1,977.5
Upgrades to counterbattery radars	Army	71.0	125.4	196.4
Bradley fire support team vehicle	Army	55.2	85.0	140.2
Fielding of M109A6 Paladin howitzer ^d	Army		349.7	349.7
Upgrades to MLRS ^c	Army	116.5	704.7	821.2
Naval surface fire support ^d	Navy	204.2	^b	204.2
Total		3,333.7	7,334.9	10,668.6

Source: Our analysis of service data.

^aIncludes service life extension program for 75 percent of existing force.

^bProcurement will not commence until after fiscal year 2001.

^cThese upgrades include an extended range rocket.

^dGAO reports on these systems are listed on the last page of this report.

The Army is in the process of modifying AH-64 Apaches with several systems, including a Longbow millimeter wave radar and a radio-frequency Hellfire missile. The millimeter-wave radar is able to detect, classify, and prioritize stationary and mobile targets, a capability that the current Apache radar does not have. The Army believes that the Longbow Apache will significantly increase its attack helicopter capabilities. It plans to begin fielding the Longbow Apache in fiscal year 1997. The radio-frequency Hellfire is a version of the existing missile that incorporates a seeker for locking onto targets. It will provide pilots with a capability to fire self-guiding missiles at targets at longer ranges than the current missile.

Another development that will improve the Army's capability to perform close support in the future is the Crusader, a self-propelled 155-millimeter field artillery system that is intended to achieve ranges of up to 50 kilometers—20 kilometers more than the current family of 155-millimeter self-propelled artillery. In addition, the Army expects Crusader to be more mobile, lethal, and accurate than existing howitzers. The Army plans to field Crusader in fiscal year 2005.

Other planned Army improvements include (1) upgrading the fire support team vehicle used to carry personnel responsible for coordinating artillery fire and CAS for infantry units to a Bradley chassis, (2) upgrading MLRS launchers to improve response time and developing an extended range MLRS rocket that can hit targets up to 50 kilometers, and (3) upgrading counterbattery radars used to detect the location of enemy artillery.

The Air Force plans to improve its fixed-wing CAS capabilities, by providing, among other things, night capability and a digital data-burst communications system, known as the improved data modem (IDM), to its A/OA-10 aircraft. IDM will allow CAS pilots to receive more accurate and timely targeting information from ground-based and airborne forward air controllers who are responsible for controlling CAS strikes. In addition, the Air Force plans to upgrade 250 F-16 Block-40 aircraft with an improved data modem, night vision goggles, compatible cockpit lighting, and modified LANTIRN navigation and targeting pods.

The Navy is continuing to improve its F/A-18s. It is in the process of installing a more capable radar on F/A-18Cs and plans to incorporate the radar on F/A-18E/F models. The Navy is also planning to improve its ability to provide naval surface fire support from surface ships.

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Services Plan to Further Improve Their
Close Support Capabilities

The Marine Corps is in the process of upgrading its AH-1W Supercobra attack helicopter for night capability as part of a three-phased upgrade program. The night targeting system includes a targeting forward looking infra-red system and a laser-designator rangefinder that will enable pilots to employ precision-guided munitions, such as Hellfire missiles, and designate targets for other close support systems. The Marine Corps process of remanufacturing day-attack AV-8B aircraft to radar/night-attack aircraft will improve their ability to identify and acquire targets at night. In addition, the Marine Corps has finished developmental testing of the Automated Target Hand-off System (ATHS), which is expected to become available in January 1997. ATHS is similar to the Air Force's IDM and will allow ground-based and airborne forward air controllers to send targeting information digitally to CAS pilots.

A Comprehensive Assessment of Joint Close Support Mission Needs and Existing Capabilities Is Needed

DOD's current assessment processes do not yield the information that the Secretary of Defense needs to weigh the merits of service-generated weapons acquisition and modernization proposals for the close support mission. The services generate their proposals from a service rather than joint perspective and frequently consider only weapons in the same general category in seeking potential solutions to identified deficiencies. Nor do the Department's assessment processes enable the Chairman, Joint Chiefs of Staff, to provide effective military advice to the Secretary of Defense on the services acquisition and modernization proposals for close support. Unless comprehensive assessments of joint mission needs and existing capabilities for close support are conducted on a routine basis, the Chairman cannot provide the strong independent military advice the Secretary needs in deciding which service proposals should be funded, in what quantities they should be procured, and what priority should be assigned to competing proposals.

Other Services' Capabilities Have Not Been Adequately Considered

Proposals to acquire and modernize close support weapons have not been based on a comprehensive assessment of joint close support requirements and capabilities. Instead, the services have advanced proposals based on their authority to organize, train, and equip for their broad roles and functions. Based on this perspective, the services have focused on unique mission needs or unique weapons system capabilities.

Within any single service, competition among weapons systems is generally limited to a single category of weapons, such as attack helicopters, artillery, or fixed-wing aircraft. Although the services routinely conduct detailed analyses of deficiencies in their specific combat capabilities, potential solutions are normally limited to consideration of weapons in the same general category.

For example, in 1993, the Marine Corps conducted a mission area analysis of fire support requirements and established a requirement for a lighter-weight 155-mm towed howitzer to replace the current 155mm towed howitzer, the M-198, to improve ground- and air-mobility of artillery. While this mission analysis included a general discussion of the role of mortars, attack helicopters, fixed wing aircraft, and naval gunfire systems, it did not consider non-artillery solutions to address the deficiencies. The study did not examine whether close support systems used by other services could be used or adopted by the Marine Corps.

Similarly, in May 1994, the Air Force decided to upgrade existing A/OA-10, and F-16 aircraft for the CAS mission as a more cost effective solution to procuring a new aircraft solely for CAS. In reaching this decision, the Air Force did not consider whether the growing capabilities of Army attack helicopters and artillery could mitigate the need for all or some of the proposed upgrades.

The JROC Has Exercised Only Limited Oversight of Close Support Acquisition Programs

The JROC—a senior advisory body to the Chairman of the Joint Chiefs of Staff—is responsible for validating service-generated mission needs and weapons acquisition proposals. However, the JROC's oversight of close support systems has not included the full range of weapons used for close support but rather has been limited to oversight of major acquisition programs. Moreover, although a new process for assessing joint warfighting capabilities was introduced in 1994, a separate assessment of joint close support needs and capabilities has not yet been made.

JROC Reviews Have Been Limited to Major Acquisition Programs

As outlined in its charter, the JROC is expected to

- review and approve the military need for all potential major defense acquisition programs;
- assess joint warfighting capabilities;
- assess military requirements for defense acquisition programs; and,
- assign joint priorities among major programs meeting valid requirements.

In overseeing the requirements generation process and in determining mission need, the JROC is expected to emphasize the need to reduce parallel and duplicate development efforts. The JROC's charter also states that, in conducting reviews of military needs and acquisition programs, it should emphasize the need to eliminate unnecessary duplication in service programs.

Although the JROC's charter would appear to warrant and encourage comprehensive cross-service assessments of warfighting requirements and capabilities, we found that JROC assessments have been limited. Until recently, the JROC has not included reviews of weapons acquisition programs other than those considered to be major programs.¹ Because the majority of modernization programs fall outside the major program

¹A major defense acquisition program (MDAP) is a program with estimated research, development, test, and evaluation expenditures of more than \$300 million (FY-1990 dollars), or procurement expenditures of more than \$1.8 billion (FY-1990 dollars), or other program designated as a MDAP by the Undersecretary of Defense for Acquisition.

definition, most service initiatives have not been subject to the Council's assessment. Only 3 of the 12 close support modernization programs that we reviewed—the Air Force's F-16 CAS modernization program, the Army's AH-64 Apache Longbow upgrade program, and the Army's Crusader field artillery system—were classified as major programs and thereby subject to JROC examination. The other 9 programs, with estimated costs totaling \$5.2 billion for fiscal years 1996 through 2001, were not reviewed.²

We also found that JROC has relied heavily on narrowly focused service-generated assessments of needs and alternative solutions in making its determinations on the validity of requirements. The Commission on Roles and Missions noted in its 1995 report that this high reliance on service staff analysis runs counter to the intent of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 to increase Joint Staff independence.

**Joint Warfighting
Capability Assessments
Offer Promise but May Be
Too Narrow**

The JWCA process was established in 1994 in conjunction with a broader interpretation of the JROC's charter that included assessments of joint warfighting capabilities. According to the Joint Chiefs of Staff policy guidance, the JWCA process is intended to support the Chairman's need for assessments made from a joint warfighting perspective. By examining each of the services' capabilities in specific joint mission areas, such as air superiority, surveillance and reconnaissance, and fire support, the JWCA working groups expect to gain insight into issues involving joint warfighting mission needs and the services' plans for modernizing forces in support of those requirements. The JWCA assessments, which are to be made on a continuous basis, are intended to support the Chairman of the Joint Chiefs of Staff in providing independent advice to the Secretary of Defense on the services' acquisition and modernization proposals.

Until recently, assessments of the close support mission had been split between the ground maneuver and joint strike assessment areas, with the ground maneuver working group assessing ground-based close support along with other ground maneuver functions, and the joint strike group assessing CAS capabilities along with other strike functions such as interdiction. The ground maneuver working group was to have been responsible for integrating the two assessments for purposes of evaluating overall close support capabilities, requirements, and modernization proposals. However, the ground maneuver working group spent more than

²Based on a broader interpretation of its mandate, the JROC recently began including some additional service plans and programs in its assessments, although it remains unclear to what extent JROC's assessments will be broadened.

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a year organizing its task and was reorganized before it had produced any recommendations. In late 1995, this group was renamed the Land and Littoral Warfare JWCA.

Although the JWCA charged with assessing close support should theoretically provide improved understandings of joint warfighting requirements and existing capabilities, the results thus far have been disappointing. For example, this JWCA has yet to address the types of capability and the number of weapons needed to meet joint close support requirements; the types, capabilities, and number of close support weapons currently operated by the services and their joint effectiveness; and the effectiveness and affordability of alternative force mixes.

According to its director, the Land and Littoral Warfare JWCA has just begun an assessment of the services' close support capabilities and requirements with a goal of influencing the Chairman's Program Recommendations for fiscal year 1998. This JWCA working group hopes to be in a position to recommend which systems, among the various ones proposed by the services, should be developed and/or modernized for the joint close support mission. The working group will develop assessment models based on the strategy and scenarios of the current Defense Planning Guidance.

While the anticipated assessment could improve the information available to the Secretary of Defense to weigh acquisition and modernization proposals for close support, questions remain over how the working group will interpret the scope of its work. For example, it is unclear what priority the working group will give to the close support assessment and whether the assessment will include the full range of weapon systems that can be used for this mission. It is also unclear whether the working group will address the question of sufficiency—the mix and quantity of systems that are needed for the overall close support mission. Moreover, it is unclear how the working group intends to overcome the problem of being too heavily dependent upon service-generated analysis.

Air Force-Army Debate Over CAS Illustrates Need for Comprehensive Assessment of Requirements

Improvements in Other Weapons Have Reduced Requirements for Fixed-Wing CAS

The continuing debate between the Air Force and the Army over the role of fixed-wing aircraft for CAS illustrates the need for a broader assessment of requirements and capabilities. While both services acknowledge that the Army's need for fixed wing CAS has diminished, DOD has not determined how many and what mix of aircraft are needed. This is important because the Air Force plans to spend about \$547 million to upgrade 623 fixed wing aircraft specifically for CAS. An assessment of overall close support requirements and capabilities may identify what quantity of fixed-wing aircraft are needed to carry out CAS.

In its submission to the Commission on Roles and Missions of the Armed Forces, the Army acknowledged that the added firepower of rockets, artillery, and attack helicopters had "substantially reduced the need for fixed wing fire support." The Air Force told the Commission that the number of fixed-wing CAS sorties flown to support ground troops has declined significantly since the Korean War. Moreover, the Air Force expects the demand for fixed-wing CAS to further decline as attack helicopter capabilities improve. The Air Force stated that attack and scout helicopters operating in close coordination with ground units are the optimum team for CAS and that fixed-wing aircraft should only be used for emergency back up. The Air Force suggested that the Army could provide its own close air support with attack helicopters and that the Army should be assigned CAS as a primary mission. The Air Force also proposed that its CAS role be downgraded from a primary to a collateral function. In connection with this proposal, the Air Force favored eliminating A/OA-10 aircraft from its inventory.

The Army recognized that the need for fixed-wing CAS has declined over time but opposed the Air Force's proposal to downgrade Air Force CAS responsibilities. The Army noted that while the need for fixed wing CAS has declined, it remains an important capability especially in early entry operations, under circumstances when close support targets exceed the range of land-based systems, and/or when special munitions, such as heavy and/or precision-guided bombs, are required. An Army roles and missions official told us that the Army is more concerned that the Air Force retain primary responsibilities for CAS than it is about what kinds of aircraft the Air Force intends to use. While the Army supports CAS as a primary function of the Air Force, it considers the types and quantities of the aircraft to be the prerogative of the Air Force.

In December, 1994, following a change in the Air Force Chief of Staff, the Air Force reversed its September 1994 position and told the Commission that it believes that fixed-wing CAS is still required and that it therefore intends to retain primary CAS responsibilities and the means to execute them. As a result, the Air Force is now committed to retaining A/OA-10 aircraft and to modernizing A/OA-10 and F-16 aircraft for the CAS role. Although the Air Force had planned to retire all of its A/OA-10s as early as fiscal year 2002, it now plans to maintain 316 of these aircraft in its force structure through fiscal year 2028.

Budget Implications of Fixed-Wing CAS Debate Could Be Significant

A broad assessment of joint CAS requirements leading to recommendations on the appropriate numbers, types, and mix of fixed-wing requirements could result in substantial budgetary savings depending on the outcome of the assessment. In 1994 the Congressional Budget Office estimated that about \$1.9 billion could be saved over 5 years if the Air Force retired all A/OA-10 aircraft. Similarly, the Air Force told the Commission on Roles and Missions of the Armed Forces that if it retired all of its A/OA-10s, it could save approximately \$5.8 billion in procurement, RDT&E, operation and maintenance, and other indirect costs between fiscal years 1995-2001.

The potential loss of the A/OA-10s would force the Army to rely more on its attack helicopters for CAS than it has in the past. If the Air Force eliminated its A/OA-10s, its multi-role F-16s would become the Air Force's primary CAS aircraft. Accordingly, any assessment of fixed-wing CAS requirements would need to consider the impact that increased use of F-16s for CAS would have on the capability of this aircraft to conduct other missions, such as interdiction.

Conclusion

Collectively, the services' current mix of weapon systems constitutes a formidable joint close support capability. Nevertheless, the services plan to invest about \$10.6 billion over the next 6 years in weapons upgrades and enhancements to further add to this capability. Whether these investments represent the most appropriate, cost-effective mix of weapon systems to meet close support missions is unclear because each military service has continued to propose enhancements to its capabilities without adequate consideration of the capabilities of its other weapons or those of other services.

Moreover, the Department's assessment processes do not enable the Chairman, Joint Chiefs of Staff, to provide effective military advice to the

Secretary of Defense on the services acquisition and modernization proposals for close support. The JROC has only assessed modernization proposals involving major weapon systems rather than the full range of weapons used for close support. Moreover, although a joint warfighting assessment process was instituted in late 1994 to support the JROC in its recommendations to the Chairman, a separate assessment of the close support mission has not yet been made. Unless comprehensive assessments of joint mission needs and existing capabilities for close support are conducted on a routine basis, the Chairman cannot provide the independent military advice the Secretary needs in deciding which systems should be funded, in what quantities they should be procured, and what priority should be assigned to competing proposals.

Recommendation

To assist the Secretary of Defense in determining whether and which proposed enhancements to close support systems should be funded, and in what quantities and priority, we recommend that comprehensive cross-service assessments of overall joint close support mission needs, existing close support systems, and planned enhancements be made on a routine basis. Such assessments might be made within the context of the JWCA process although alternative mechanisms might be explored.

To be useful to decisionmakers, these assessments should include a determination of which existing capabilities should be retained, modernized, or retired, and in what quantities to ensure full joint capability. They should be broad enough to encompass all close support capabilities—not just major weapon systems—and service-generated analysis should be supplemented by other analytical support, where independence is critical. Because some systems have multiple roles, the assessments need to recognize the contributions of these systems to these other missions.

Agency Comments

DOD partially agreed with GAO's recommendation but stated that (1) the land and littoral warfare JWCA is conducting a comprehensive assessment of the fire support requirements and capabilities for the close battle; (2) the Planning, Programming, and Budgeting System (PPBS)—together with data from the JWCA and other DOD studies—provides leaders with the information they need to make the determinations cited in our report; and, (3) the assessments currently underway and planned are sufficiently broad in scope, and diverse in sources of analytical data to ensure that service

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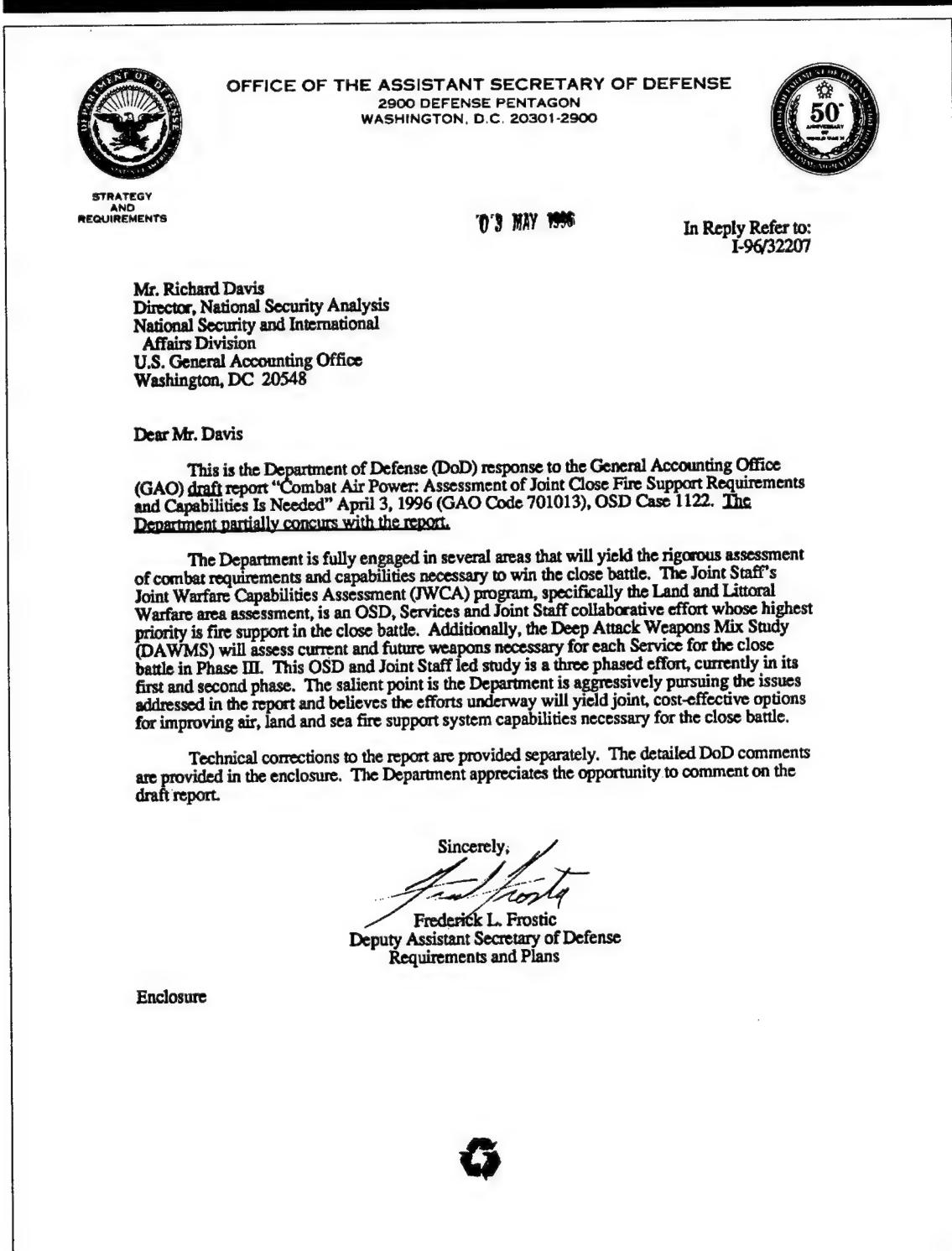
parochialism is held in check and the necessary degree of purity of data and process is being preserved.

We recognize the JWCA process as a positive approach that may lead to improved assessment of existing close support capabilities and service-generated requirements. We continue to believe, however, that to be of most use to decisionmakers, the assessment process must deal directly with the issue of sufficiency—that is, the mix and quantity of systems needed to ensure full capability. Accordingly, we believe that ongoing and future assessments should include recommendations on which close support systems should be developed, modernized, retained, or retired.

Based on our discussions with members of JWCA working groups, we are not as optimistic as DOD that service influence over the requirements generation process is being held in check. The Commission on Roles and Missions of the Armed Forces recently concluded that DOD's current management processes allow the services to develop and field weapons without a DOD-wide assessment of the need for these weapons. Thus, the Commission appears to support our contention that service-generated analyses of requirements should be routinely challenged by service-independent analyses of DOD-wide requirements.

The full text of the DOD's comments appears in appendix I.

Comments From the Department of Defense



Appendix I
Comments From the Department of Defense

**GAO DRAFT REPORT - DATED APRIL 3, 1996
(GAO CODE 701013) OSD CASE 1122**

"COMBAT AIR POWER: ASSESSMENT OF JOINT FIRE SUPPORT REQUIREMENTS AND CAPABILITIES IS NEEDED"

DEPARTMENT OF DEFENSE COMMENTS

* * * *

RECOMMENDATION

RECOMMENDATION: "...that comprehensive cross-service assessments of overall joint close fire support mission needs, existing close fire support systems, and planned enhancements be made on a routine basis. Such assessment might be made within the context of the JWCA process although alternative mechanisms might be explored."

DOD RESPONSE: PARTIALLY CONCUR. A comprehensive assessment of the fire support requirements and capabilities for the close battle is being conducted by the Land and Littoral Warfare Assessment Division (LLWAD) under the JWCA process. Although the DoD is always searching for improved methods of assessing requirements and capabilities, the LLWAD JWCA is the current process of choice for the department.

RECOMMENDATION: "...these assessments should include a determination of which existing capabilities should be retained, modernized, or discarded and in what quantities to insure full joint capability."

DOD RESPONSE: PARTIALLY CONCUR. The Department's Planning, Programming, and Budgeting system, in conjunction with the applicable JWCA and information from other DoD studies, provides leaders the information necessary to make the determinations cited in the report. However, information on force structure changes and current operational concepts is also considered when decisions balancing joint requirements and capabilities are affected. Modernization, recapitalization and retirement decisions for all combat systems will be made as necessary.

RECOMMENDATION: "They [assessments] should be broad enough to encompass all close fire support capabilities—not just major weapon systems—and service-generated analysis should be supplemented by other analytical support, where independence is critical. Because some systems have multiple roles, the assessments need to recognize the contributions of these systems to these other missions."

DOD RESPONSE: PARTIALLY CONCUR. Assessments currently underway, and those planned, are all sufficiently broad in scope (e.g., weapons, platforms, and services) and diverse in the sources (e.g., DoD, Joint Staff, Service, and FFRDC) of analytical data used. The Department is confident Service parochialism is held in check and the necessary degree of purity of data and process is being preserved. The decision to seek independent analysis will be made as required.

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Related GAO Products

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